INFORMATION SECURITY USING PHASE SHIFT DIGITAL HOLOGRAPHY

ABSTRACT OF THE INVENTION

A method and system for encrypting multi-dimensional information utilizing digital holography is presented. A phase-shifting interferometer records the phase and amplitude information generated by a three-dimensional object at a plane located in the Fresnel diffraction region with an intensity-recording device. Encryption is performed by utilizing the Fresnel diffraction pattern of a random phase mask. Images of different perspectives of the three-dimensional object focused at different planes can be generated digital or optically with the proper key after decryption.

After decryption, images of the object, focused at different planes, can be generated digitally or optically. The method allows for the reconstruction of the object with different perspectives from a single encrypted image. The method does not require sending the key exclusively through a digital communication channel. Instead, a copy of the random phase key itself can be sent to the authorized user.

A method of forming an image of an object is disclosed. The method comprises forming an original hologram of the object; compressing the original hologram of the object to form a compressed hologram; decompressing the compressed hologram of the object to form a decompressed hologram; and reconstructing the object from the decompressed hologram to form a multi-dimensional image of the object.